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Docket No.: SON-3163
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Tomiji Tanaka et al.

Application No.: 10/579,903 | Confirmation No.: 6919

Filed: November 15, 2006 | Art Unit: 2828

For: EXTERNAL CAVITY TYPE SEMICONDUCTOR LASER | Examiner: Michael W. Carter

REPLY BRIEF

MS Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

This is a Reply Brief under 37 C.F.R. § 41.41 in response to the Examiner's Answer dated June 9, 2009.

All arguments presented within the Appeal Brief dated April 6, 2009, are incorporated herein by reference. Additional arguments are provided herein.

I. STATUS OF CLAIMS

I.A. Current Status of Claims

A complete listing of the claims with corresponding status is provided as follows:

Claims 1-18 (Rejected).

I.B. Claims On Appeal

Appellant hereby appeals the final rejection of claims 1-18.

II. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The issues presented for consideration in this appeal, with separate arguments as noted in the following sections, are as follows:

II.A Whether the Examiner erred in rejecting claims 1, 3-4, and 11 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Pat. No. 4,913,525 to Asakura et al. ("Asakura") in view of U.S. Pat. No. 6,488,419 to Kato et al. ("Kato").

II.B Whether the Examiner erred in rejecting claims 2 and 7 under 35 U.S.C. § 103(a) as being unpatentable over Asakura in view of Kato, and further in view of U.S. Pat. No. 5,870,417 to Verdiell et al. ("Verdiell").

II.C Whether the Examiner erred in rejecting claims 5, 6 and 12 under 35 U.S.C. § 103(a) as being unpatentable over Asakura in view of Kato, and further in view of Mizuno et al., "100mW Kink-free Blue-violet Laser Diodes with Low Aspect Ratio," Proceedings of the 11th Sony Research Forum, 2001 ("Mizuno").

II.D Whether the Examiner erred in rejecting claims 8-10 under 35 U.S.C. § 103(a) as being unpatentable over Asakura in view of Kato, and further in view of U.S. Pat. No. 7,027,469 to Sidorin ("Sidorin").

II.E Whether the Examiner erred in rejecting claims 13-18 under 35 U.S.C. § 103(a) as being unpatentable over Asakura in view of Kato, Mizuno, Verdiell and Sidorin.

These issues are discussed in the following section.

III. ARGUMENT

III.A. Introduction

III.A.1 Claims 1, 3, 4, and 11

In the Final Office Action of June 4, 2008, the Examiner erred in rejecting claims 1, 3-4, and 11 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Pat. No. 4,913,525 to Asakura et al. ("Asakura") in view of U.S. Pat. No. 6,488,419 to Kato et al. ("Kato").

III.A.2 Claims 2 and 7

In the Final Office Action of June 4, 2008, the Examiner erred in rejecting claims 2 and 7 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Asakura in view of Kato, and further in view of U.S. Pat. No. 5,870,417 to Verdiell et al. ("Verdiell").

III.A.3 Claims 5, 6, and 12

In the Final Office Action of June 4, 2008, the Examiner erred in rejecting claims 5, 6 and 12 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Asakura in view of Kato, and further in view of Mizuno et al., "100mW Kink-free Blue-violet Laser Diodes with Low Aspect Ratio," Proceedings of the 11th Sony Research Forum, 2001 ("Mizuno").

III.A.4 Claims 8-10

In the Final Office Action of June 4, 2008, the Examiner erred in rejecting claims 8-10 under 35 U.S.C. § 103(a) as being unpatentable over Asakura in view of Kato, and further in view of U.S. Pat. No. 7,027,469 to Sidorin ("Sidorin").

III.A.5 Claims 13-18

In the Final Office Action of June 4, 2008, the Examiner erred in rejecting claims 13-18 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Asakura in view of Kato, Mizuno, Verdiell and Sidorin.

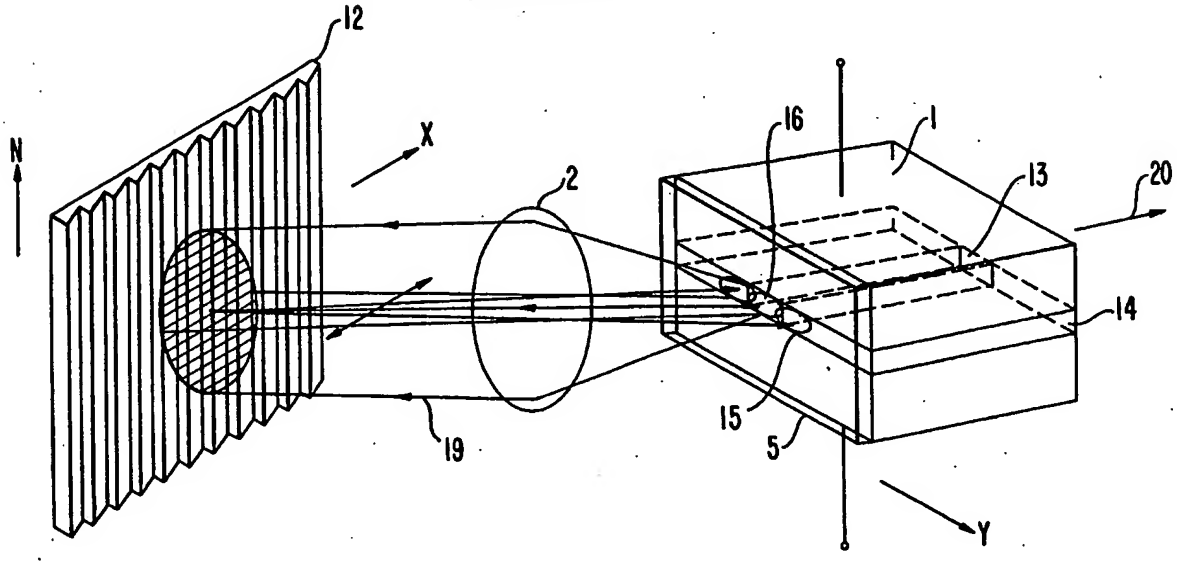
Consistent with the grouping of claims in the following section, these rejections are variously deficient as noted in the separate arguments.

III.B. The Examiner erred in rejecting claims 1, 3-4, and 11 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Pat. No. 4,913,525 to Asakura et al. ("Asakura") in view of U.S. Pat. No. 6,488,419 to Kato et al. ("Kato").

Asakura seeks to provide a stabilized light source having a high frequency purity. (Asakura, col. 2, ll. 19-21.) Asakura discloses, as shown in FIG. 2 below, a frequency stabilized light source including a semiconductor laser chip 1, a lens 2, an echellette grating 12, and an anti-reflection coating 5. (Asakura, col. 1, ll. 25-28.)

According to Asakura, incident light 19 is dispersed depending on its wavelengths, and feedback light 16 with a specific wavelength determined from the angle of the grating 12 is fed back to the active layer 13 of the semiconductor laser chip 1. (Asakura, col. 1, ll. 28-32.) "The semiconductor laser chip 1 oscillates at the wavelength of the feedback light 16 and emits an output light beam 20 with a stabilized frequency from the other face." (Asakura, col. 1, ll. 32-35.)

FIG. 2
(PRIOR ART)



Asakura, FIG. 2

The Non-final Office Action of November 16, 2007, makes clear that Asakura fails to disclose or suggest many of the features recited in claim 1, namely:

> *a window glass disposed opposite to a beam emission surface of the semiconductor laser device; ...*
>
> *wherein the window glass is arranged in a first state or a second state,*
>
> *wherein in the first state the window glass is nearly in parallel with a first axis and is not in parallel with a second axis,*
>
> *wherein in the second state the window glass is not in parallel with the first axis, the window glass being nearly in parallel with the second axis, and*
>
> *wherein the first axis is nearly perpendicular to a surface that is in parallel with at least one of the boundary surfaces of the activation layer and other layers of the semiconductor laser device, and the second axis is nearly in parallel with the beam emission surface of the semiconductor laser device and nearly perpendicular to the first axis.* (Non-final Office Action of November 16, 2007, pg. 2, line 20 - pg. 3, line 6.)

Additionally, although Asakura discloses a light beam coming out of one face of the semiconductor laser chip being dispersed by the grating depending on the wavelength, and light with a specific wavelength being fed back to the active layer of the semiconductor laser chip, (Asakura, col. 3, ll. 6-13), Asakura makes no mention of "*a grating that receives a beam emitted from the semiconductor laser device through [a] window glass and returns a beam having a predetermined wavelength to the semiconductor laser device*[.]"

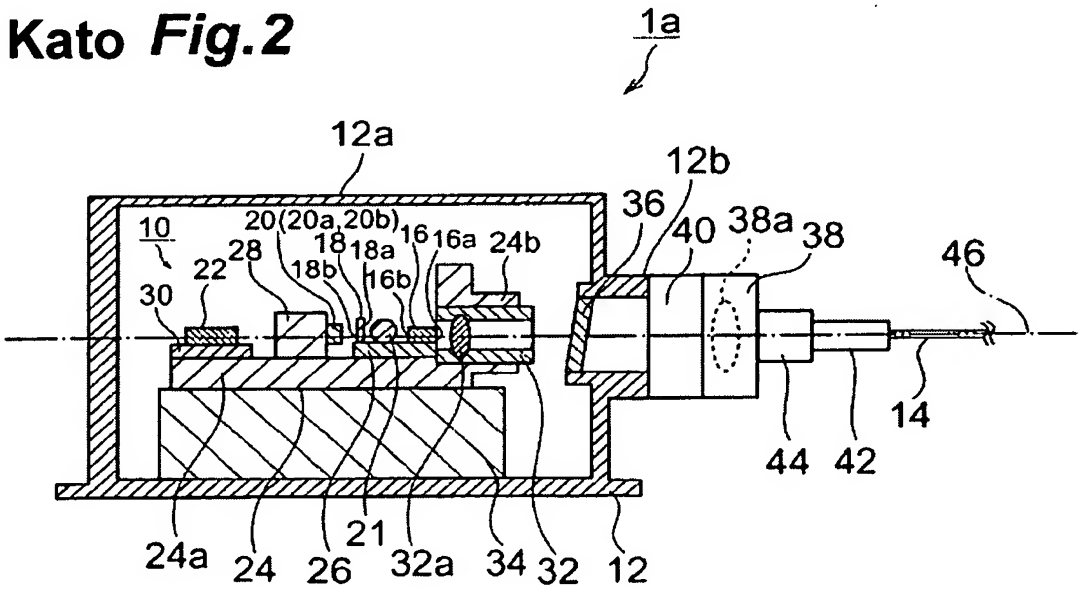
The Office Action relies on Kato to cure the deficiencies of Asakura. (Non-final Office Action, pg. 3, ll. 7-18.) The Office Action alleges that the hermetic glass 36 in Kato figure 2 is a window in the second state, parallel with the second axis. (Non-final Office Action, pg. 3, ll. 16-18.) The Office Action then concludes that "it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to use Kato's window to seal Asakura's laser." (Non-final Office Action, pg. 3, ll. 19-20.)

However, as will be shown below, Kato clearly fails to cure the deficiencies of Asakura. Specifically, Kato fails to disclose or suggest "*a window glass disposed opposite to a beam emission surface of the semiconductor laser device; a grating that receives a beam emitted from the*

semiconductor laser device through the window glass and returns a beam having a predetermined wavelength to the semiconductor laser device[.]"

Kato discloses a semiconductor light emitting device 16, a photodetection device 20, an etalon device 18, and a collimating lens 21. (Kato, col. 1, ll. 66-67; *see* Kato FIG. 2, reproduced below.) Like Asakura, Kato seeks to provide a distributed feedback (DFB) semiconductor laser having a high absolute wavelength accuracy. (Kato, col. 1, ll. 9-13; ll. 38-42.). Kato, like Asakura, contains a diffraction grating, the diffraction grating of Kato being fabricated within the semiconductor laser device 16. (Kato, col. 9, ll. 10-16.) However, Kato suggests that such a diffraction grating does not easily yield a stable and accurate oscillation wavelength. (Kato, col. 1, ll. 18-14.) Therefore, through the use of a photodetector/etalon feedback device and adjusting the injection current, Kato discloses a means to keep the wavelength of the light output from the semiconductor light emitting device constant. (Kato, col. 1, l. 65 – col. 2, l. 39.)

Kato *Fig.2*

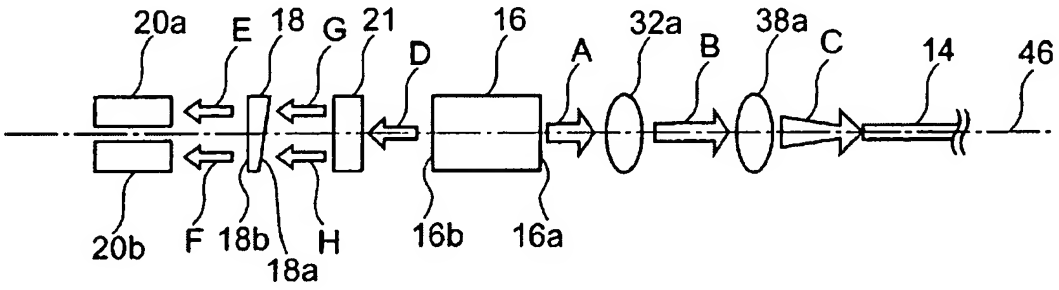


The semiconductor 16 of Kato has a first light reflecting surface 16b, a second light emitting surface 16a, and an active layer. (Kato, col. 16, ll. 13-19.) As shown in Kato FIG. 12A, reproduced below, Light D, emitted from light emitting surface 16a, is used for feedback purposes. (Kato, col. 16, ll. 17-22.) Photodetectors 20a, 20b are located so as to receive transmitted light from the first light reflecting surface 16b of the semiconductor light emitting device. (Kato, Abstract.) Etalon 18

is located between the first light reflecting surface 16b and the photodetector 20a, 20b. (Kato, Abstract.)

Kato Fig. 12A describes the propagation of light in the semiconductor laser device 1. (Kato, col. 16, ll. 6-8.) Light D is collimated and spectroscopically split by the etalon 18 to obtain a monitor light having a predetermined wavelength spacing before the monitor light is passed to photodetectors 20a, 20b. (Kato, col. 15, ll. 60-65.) If the wavelength components of light from the semiconductor light emitting device change, the variation is converted into electric signals by photodetectors 20a, 20b. (Kato, col. 2, ll. 22-32.) A difference signal between the photodetectors 20a, 20b represents a direction of the change of the wavelengths of the light, and by adjusting the injection current, the light output from the semiconductor laser can be held constant. (Kato, col. 2, ll. 33-39.)

Kato *Fig. 12A*



On the other hand, Light A is output from light emitting surface 16a to enter optical fiber 14. (Kato, col. 16, ll. 13-17.) In other words, Light A is not used as a feedback or monitored light to maintain a constant wavelength from the semiconductor laser, but is the light output to the optical fiber.

The only description Kato makes concerning the hermetic glass 36 shown in Kato FIG. 2 above is: "[a] wall surface of the package main body 12a has an optical window sealed by hermetic glass 36, in its portion communicating with the cylindrical portion 12b." The hermetic glass 36, as disclosed by Kato, would thus be positioned between lens 32a and lens 38a in Kato FIG. 12A above, and only emitted light B would pass through the hermetic glass 36. Consequently, the light

output from the semiconductor laser 16 only passes through the hermitic glass 36 once. It is significant that that light does ***NOT*** return to the semiconductor device 16.

Because light 16 only passes through hermitic window 36 once, Kato clearly fails to disclose "*a grating that receives a beam emitted from the semiconductor laser device through [a] window glass and returns a beam having a predetermined wavelength to the semiconductor laser device*," as recited in claim 1.

In the Request for Reconsideration for reconsideration, Appellant stressed that Kato fails to disclose or suggest this specific feature, and by way of explanation, noted:

> The hermetic glass 36, as disclosed by Kato, would thus be positioned between lens 32a and lens 38a in Kato Figure 12A, and only light B passes through the hermetic glass 36. Kato makes no mention of a grating receiving light after it passes through the hermetic glass 36. Furthermore, Kato also makes no mention of light returning to the semiconductor after passing through the hermetic glass 36[.] Request for Reconsideration, pg. 9, ll. 16-21.

In the Advisory Action of September 18, 2008, the Examiner, overlooking that Kato failed to disclose "*a grating that receives a beam emitted from the semiconductor laser device through [a] window glass and returns a beam having a predetermined wavelength to the semiconductor laser device*," countered that the feature "a grating receiving light after it passes through the hermitic class" was not recited in the rejected claim. (Advisory Action of September 18, 2008, pg. 2, ll. 5-10.)

Further, in the Advisory Action of September 18, 2008, overlooking the merit of the Appellant's remarks, the Examiner continued, stating: "[t]he [A]pplicant argues that the glass must be between the grating and the laser. However, this limitation is not present in the language of claim 1." (Advisory Action of September 18, 2008, pg. 2, ll. 11-12.)

This statement shows that the Examiner has failed to understand the features of claim 1 and to ascertain the differences between the prior art and the claim at issue. Claim 1 does not recite, nor does Appellant maintain "that the glass be between the grating and the laser." But, claim 1 recites that the grating receive "*a beam emitted from the semiconductor laser device through the window glass and returns a beam having a predetermined wavelength to the semiconductor laser device*[.]"

In judging the patentability of a claim "all words in [the] claim must be considered[.]" *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970). In failing to consider the words "*through the window glass*" and "*return*," the Examiner has failed to consider all the words in claim 1.

The feature "*a grating that receives a beam emitted from the semiconductor laser device through [a] window glass and returns a beam having a predetermined wavelength to the semiconductor laser device*," is significant and should not be overlooked. It is due to this feature, that the invention is able to increase the output and improve the single mode characteristics of the laser. *See* Spec. pg. 12, line 6 – pg. 13, line 7; pg. 18, ll. 5-17; *compare* Appellant's Fig. 6 and Appellant's Fig. 9.

In the Examiner's Answer, the Examiner contends that although Asakura makes no mention of the light passing through a window after it is converged by the lens, the combination with Kato "does teach a window after a light is converged in order to seal the laser while allowing the light to be output from the laser." (Examiner's Answer, p. 12, ll. 6-9.)

The Examiner puts weight on the fact that Kato discloses light passing through a "window after [the] light is converged in order to seal the laser while allowing the light to be output from the laser." (Examiner's Answer, p. 12, ll. 5-9.) In doing so, the Examiner seems to again overlook the significance of the placement of the window such that "*a grating that receives a beam emitted from the semiconductor laser device through [a] window glass and returns a beam having a predetermined wavelength to the semiconductor laser device*[.]"

Further, in the Examiner's Answer, the Examiner suggests that it would have been obvious to one of ordinary skill in the art to use Kato's hermitic glass with Asakura's laser by placing the glass such that a grating receives a beam from the laser through the window and returned to the laser in order to hermitically seal the laser while still allowing light to interact with the grating. (Examiner's Answer, p. 5, l. 21 – p. 6, l. 3.) However, the Examiner gives no reason why it would have been obvious to one of ordinary skill in the art to place a hermitic seal between the feedback grating and the laser. In fact, neither Asakura nor Kato disclose or suggest sealing the

semiconductor laser from the wavelength stabilizer, whether that stabilizer is a diffraction grating or a photodetector/etalon feedback device.

Because even the combination of Asakura and Kato would still fail to yield the features of Appellant's claimed invention, a *prima facie* case of obviousness has not been presented for independent claim 1. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974).

Claims 3, 4 and 11 depend from claim 1 and thus incorporate the distinct features recited therein, as well as their separately recited, patentably distinct features.

Accordingly, Appellant respectfully requests reversal of the Examiner's rejection of claims 1, 3-4, and 11 under 35 U.S.C. § 103(a) as being unpatentable over Asakura in view of Kato.

III.C. The Examiner erred in rejecting claims 2 and 7 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Asakura in view of Kato, and further in view of U.S. Pat. No. 5,870,417 to Verdiell et al. ("Verdiell").

Claims 2 and 7 depend from claim 1 and thus incorporate the features recited therein. As described above, Asakura and Kato fail to disclose these claimed features. Verdiell discloses a thermal compensator for waveguide DBR sources, and is introduced as purportedly disclosing an angle between the surface of the window glass and the second axis in the range of 5-12 degrees. Even assuming, *arguendo*, that these features might be disclosed, there is no disclosure or suggestion of the above-described features regarding claim 1, so the three way combination of references would fail to yield what is claimed therein.

Accordingly, Appellant respectfully requests reversal of the Examiner's rejection of claims 2 and 7 under 35 U.S.C. § 103(a) as being unpatentable over Asakura in view of Kato, and further in view of Verdiell.

III.D. The Examiner erred in rejecting claims 5, 6, and 12 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Asakura in view of Kato, and further in view of Mizuno et al., "100mW Kink-free Blue-violet Laser Diodes with Low Aspect Ratio," Proceedings of the 11th Sony Research Forum, 2001 ("Mizuno").

Claims 5, 6 and 12 depend directly or indirectly from independent claim 1, and thus incorporate the features recited therein. Asakura and Kato fail to disclose such features as described above. Mizuno is introduced as disclosing a blue laser diode and certain power features, but Mizuno does not address the above-described features of claim 1.

Accordingly, Appellant respectfully requests reversal of the Examiner's rejection of claims 5, 6, and 12 under 35 U.S.C. § 103(a) as being unpatentable over Asakura in view of Kato, and further in view of Mizuno.

III.E. The Examiner erred in rejecting claims 8-10 under 35 U.S.C. § 103(a) as being unpatentable over Asakura in view of Kato, and further in view of U.S. Pat. No. 7,027,469 to Sidorin ("Sidorin").

Claims 8-10 depend from claim 1 and thus incorporate the features recited therein. As described above, Asakura and Kato fail to disclose these claimed features. Sidorin is introduced for purported disclosures of the additional features recited in claims 8 and 10 regarding cavity length, but does not address and offers no remedy to the deficiencies of Asakura and Kato. Thus even the combination of Asakura, Kato and Sidorin would still fail to yield the features of Appellant's claim 1, let alone dependent claims 8-10.

Accordingly, Appellant respectfully requests reversal of the Examiner's rejection of claims 8-10 under 35 U.S.C. § 103(a) as being unpatentable over Asakura in view of Kato, and further in view of Sidorin.

III.F. The Examiner erred in rejecting claims 13-18 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Asakura in view of Kato, Mizuno, Verdiell and Sidorin.

For reasons similar to those provided regarding claim 1 above, claim 13 is neither disclosed nor suggested by Asakura in view of Kato. Nor do Mizuno, Verdiell, or Sidorin remedy these deficiencies. Accordingly, a prima facie case of obviousness has not been presented regarding claim 13. Claims 14-18 depend from claim 13 and thus incorporate the features recited therein.

These claims are thus also distinct for their incorporation of the features in the independent claim as well as for their separately recited patentably distinct features.

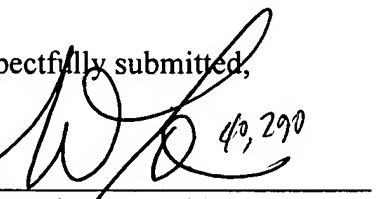
Accordingly, Appellant respectfully requests reversal of the Examiner's rejection of claims 13-18 under 35 U.S.C. § 103(a) as being unpatentable over Asakura in view of Kato, Mizuno, Verdiell and Sidorin.

IV. CONCLUSION

For the reasons stated above, claims 1-18 are considered allowable. Reversal of the Examiner's decision is respectfully requested.

Dated: August 5, 2009

Respectfully submitted,



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